Department of Mechanical Engineering Technology

Course number/name:

IND 1112 Engineering Drawing I

Credits/contact hours:

2 credits, two meetings each with 2 hours

Instructor/coordinator:

Gaffar Gailani, Professor of Mechanical Engineering Technology

Text book/title/author/year

James D. Bethune, Engineering Graphics with AutoCAD 2011, Prentice Hall, ISBN-10: 0138015910

Specific course information

Catalog description:

An introduction to computer aided drafting. Subject areas covered are: CAD working environment, various coordinate systems, basic 2-D geometric construction, introduction of orthographic projection theory, orthographic views, section views, and auxiliary views. Laboratory work utilizes computer-aided drafting (CAD) systems.

Pre/Corequisites:

None

Required/elective/selected elective:

Required for Mechanical Engineering Technology and Industrial Design Technology

Course learning objectives:

1. Mastery of the knowledge in orthographic projection theory and skills in constructing various 2D geometries.
2. Ability to apply basic math (algebra, trigonometry, and geometry) in constructing various views using the state-of-the-art CAD software.
3. Ability to communicate effectively using graphic standards in homework and the project.
4. Ability to finish the homework and project with quality and to meet deadline.

Course addresses ABET student outcomes:

SO1. an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve well-defined engineering problems appropriate to Mechanical Engineering Technology;

SO2. an ability to design solutions for well-defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline;

SO3. an ability to apply written, oral, and graphical communication in well-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature

Brief list of topics to be covered:

- Overview of CAD. Operating systems used in PC; AutoCAD interfaces: Toolbars, Menus, Cursor Menus, The command window, the text windows; Accessing commands: Using toolbar, using menus, using command line; Switching from dialog box to command line; Saving files; File naming convention. Laboratory work: Practicing interacting with AutoCAD GUI, pull-down menus, and create simple drawings.

- 2D Basics. Drawing units (Architectural, Decimal, Engineering, Fractional, and Scientific); Starting a new drawing; Standard drawing sheet sizes; Drawing limits; Setting up grid and snap; Using layers and colors. Coordinate systems (Absolute and relative, rectangular and polar); World coordinate system (WCS) and User defined coordinate system (UCS); Using direct distance entry; Shifting and rotating the coordinate systems; Locating a new UCS origin; Restoring the UCS to WCS. Laboratory work: Practice setting up grids and snaps; create geometry using different coordinate systems; learn mode draw commands.

- Fundamentals of 2-D Construction. Types of lines (visible lines, centerlines, hidden lines, phantom lines, and leaders); Creating line objects (Line, polylines, multilines, polygons, freehand sketching). Laboratory work: Simple 2-D geometric construction. Bisecting a line or an arc; Bisecting an angle; Drawing a line through a point and perpendicular to a line; Drawing a pentagon, a hexagon, and an Octagon. Creating curved objects (Spline curves, circles, arcs, ellipses, and donuts). Use editing commands (move, copy, offset, mirror, rotate, trim, extend, erase, fillet, chamfer, and break);

- Complex 2D geometric construction and dimensioning. Laboratory work: Drawing with precision: Adjusting snap and grid alignment; Using ortho mode; Snapping to geometric points on objects; Using object snaps (endpoint, midpoint, intersection, center, quadrant, perpendicular). Applying dimensions. Terminology and conventions; linear dimensions; Dimension styles, Units; Aligned dimensions; Radius and diameter dimension; Angular dimensions; Baseline dimension; Center mark. dimensioning holes.

- Orthographic projection theory and adding text. Principal planes of projection. Three view system. Text and text styles; Using line text; using multiline text; Fonts; Using text editors. Laboratory work: Practice creating front view, top view, and the right-side view of an object. Adding and modifying text.

- Section view and auxiliary views. Different type of sections views. Auxiliary views for Inclined and oblique planes. Primary and secondary auxiliary views. Laboratory work: Practice creating section and auxiliary views.

- Working Drawings. Borderline, title block, release block, tolerance block, revision block, parts list, and drawing notes. Laboratory work: Practice creating working drawings.

- Printing and plotting. Concepts of model space and paper space. Drawing templates, and scale factor. Laboratory work: Practice printing and plotting using proper scale factor. Setting up text size based on the scale factor.